HEATHKIT® MANUAL

HEATH COMPANY • BENTON HARBOR, MICHIGAN

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YOUR HEATHKIT 90 DAY LIMITED WARRANTY

If you are not satisfied with our service - warranty or otherwise - or with our products, write directly to our Director of Customer Services, Heath Company, Benton Harbor, Michigan 49022. He will make certain your problems receive immediate, personal attention.

Our attorney, who happens to be quite a kitbuilder himself, insists that we describe our warranty using all the necessary legal phrases in order to comply with the new warranty regulations. Fine. Here they are:

For a period of ninety (90) days after purchase, Heath Company will replace or repair free of charge any parts that are defective either in materials or workmanship. You can obtain parts directly from Heath Company by writing us at the address below or by telephoning us at (616) 982-3571. And we'll pay shipping charges to get those parts to you — anywhere in the world.

We warrant that during the first ninety (90) days after purchase, our products, when correctly assembled, calibrated, adjusted and used in accordance with our printed instructions, will meet published specifications.

If a defective part or error in design has caused your Heathkit product to malfunction during the warranty period through no fault of yours, we will service it free upon proof of purchase and delivery at your expense to the Heath factory, any Heathkit Electronic Center (units of Schlumberger Products Corporation), or any of our authorized overseas distributors.

You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

Our warranty does not cover and we are not responsible for damage caused by the use of corrosive solder, defective tools, incorrect assembly, misuse, fire, or by unauthorized modifications to or uses of our products for purposes other than as advertised. Our warranty does not include reimbursement for customer assembly or set-up time.

This warranty covers only Heathkit products and is not extended to allied equipment or components used in conjunction with our products. **We are not responsible for incidental or consequential damages.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

HEATH COMPANY
BENTON HARBOR, MI. 49022

Prices and specifications subject to change without notice.

Heathkit® Manual

for the

DOLBY* FM MODULE

Model AD-1504

I-595-1764-03

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HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

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INTRODUCTION

The Model AD-1504 Dolby FM Module is a network that incorporates Dolby Laboratories' B-Type noise reduction system in conjunction with FCC-approved, encoded FM transmissions. The Module contains identical right and left channel circuits, each of which has one Dolby NE545B noise processor integrated circuit. The Dolby Module is enabled when the Dolby button on the receiver is depressed and properly encoded Dolby FM material is selected on the receiver. To insure proper reproduction of station programming, the Dolby Module is used only when suitably encoded material is being transmitted.

PARTS LIST

Check each part against the following list. Make a check (✓) in the space provided as you identify each part. Any part that is packed in an individual envelope with the part number on it should be placed back in the envelope after you identify it until it is called for in a step. Do not discard any packing materials until all parts are accounted for.

To order a replacement part: Always include the PART NUMBER. Use the Parts Order Form furnished with the kit. If a Parts Order Form is not available, refer to "Replacement Parts" inside the rear cover of the Manual. For pricing information, refer to the separate "Heath Parts Price List."

Each circuit part in this kit has a "Circuit Component Number" (R1201, C1209, D1201, etc.). The purpose of these numbers is to help you easily identify the same part in each section of the Manual. These numbers will appear:

- In the Parts List.
- At the beginning of each step where a component is installed.
- In some illustrations.
- In the sections at the rear of the Manual.

QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.

RESISTORS

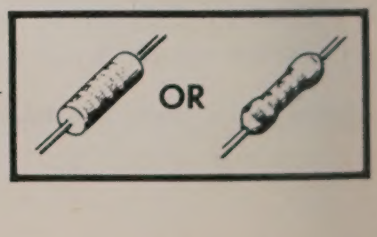
1/2-Watt

NOTES:

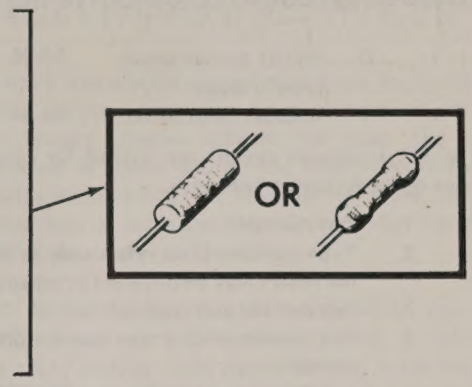
1. The resistors may be packed in more than one envelope. Open all the resistor envelopes in this pack before you check them against the Parts List.

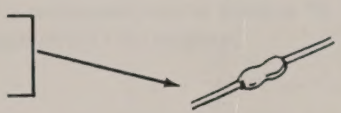
2. The following resistors have a tolerance of 5% unless they are listed otherwise. 5% is indicated by a fourth color band of gold, while 10% is indicated by a silver band.

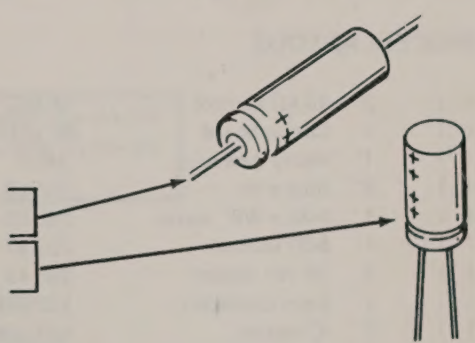
( )	2	100 Ω (brown-black-brown)	6-101	R1207
( )	2	120 Ω (brown-red-brown)	6-121	R1209
( )	2	180 Ω (brown-gray-brown)	6-181	R1213
( )	1	1000 Ω (brown-black-red)	6-102	R1216

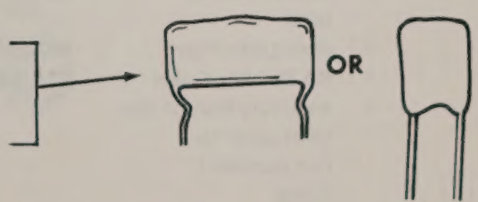


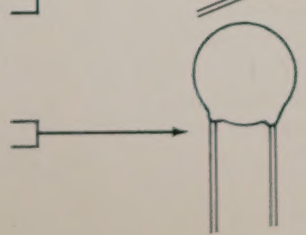
	QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
Resistors 1/2-watt (cont'd.)				
( )	2	1500 Ω (brown-green-red)	6-152	R1214
( )	2	47 kΩ (yellow-violet-orange)	6-473	R1212
( )	2	100 kΩ (brown-black-yellow)	6-104	R1208
( )	2	150 kΩ (brown-green-yellow)	6-154	R1206
( )	4	270 kΩ, 10% (red-violet-yellow)	6-274	R1205 R1215
( )	2	680 kΩ (blue-gray-yellow)	6-684	R1204
Precision, 1/2-watt, 1%				
( )	2	3300 (3.3K) Ω	2-248	R1211
( )	2	15 kΩ	2-266	R1202
( )	2	50 kΩ	2-99	R1201
CAPACITORS				
Electrolytic				
( )	2	2 μF tubular	25-215	C1204, C1215
( )	2	100 μF tubular	25-146	C1208
( )	6	10 μF vertical	25-257	C1205, C1207, C1212
Mylar*				
( )	2	.047 μF	27-129	C1209
( )	2	.1 μF	27-77	C1202
( )	2	.33 μF	27-121	C1203
( )	2	.47 μF	27-61	C1204
Polystyrene				
( )	4	1500 pF	29-7	C1201, C1216
( )	2	4700 pF	29-22	C1211
( )	2	5600 pF	29-18	C1213
( )	2	.027 μF	29-19	C1214
Other Capacitors				
( )	2	.05 μF disc	21-143	C1206











*DuPont Registered Trademark.

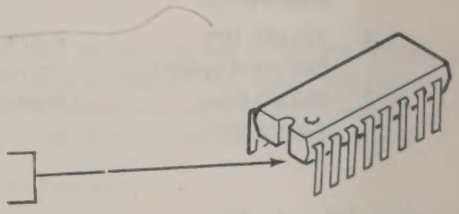
	QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.

DIODES-INTEGRATED CIRCUITS (IC)

( )	2	1N191 (brown-white-brown) diode	56-26	D1201
( )	1	VRS-5A zener diode	56-54	ZD1202

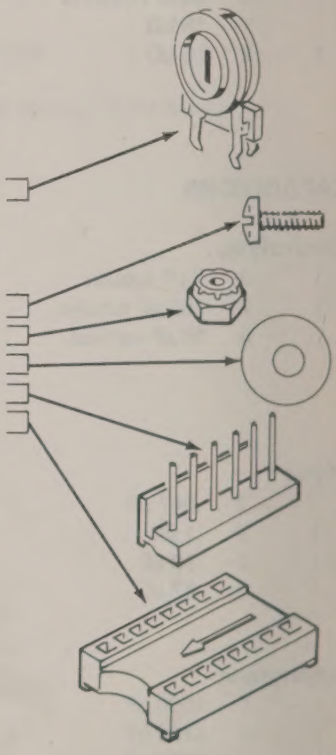
NOTE: Integrated circuits are marked for identification in one of the following four ways:

1. Part number.
2. Type number. (This refers only to the numbers; the letters may be different or missing.)
3. Part number and type number.
4. Part number with a type number other than the one shown.



( )	2	NE545B integrated circuit	442-604	IC1201

MISCELLANEOUS



( )	2	10 kΩ control	10-386	R1203
( )	1	Circuit board	85-1647-2	
( )	1'	Heavy bare wire	340-3	
( )	6"	Blue wire	344-56	
( )	1	6-32 x 3/8" screw	250-89	
( )	1	6-32 locknut	252-27	
( )	2	#8 flat washer	253-45	
( )	1	6-pin connector	432-825	P1201
( )	2	IC socket	434-268	
( )	1	Blue and white label	391-34	
( )	1	Parts Order Form	597-260	
( )	1	Kit Builders Guide	597-308	
	1	Assembly Manual (See front cover for part number.)		
( )		Solder		

ASSEMBLY NOTES

Before you start to assemble this kit, read the "Kit Builders Guide" for information on wiring, soldering, resistors, and capacitors.

When you install parts on the circuit boards in the following circuit board pictorials, position all parts as shown. Follow the instructions carefully and read the entire step before you perform each operation.

Use 1/2-watt, 5% (fourth band gold) resistors unless directed otherwise in a step. Resistors will be designated by the color code and the resistance value in Ω (ohms) or kΩ (kilohms).

Capacitors will be designated by the capacitance value and type in μF (microfarads) or pF (picofarads). Before you install a disc capacitor, remove any excess body coating material from its leads which would protrude through the circuit board and prevent the soldering of the leads to the foil.

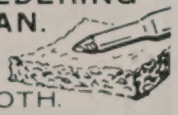
The "component" side of the circuit board has the outlines of the parts printed on it; the "foil" side is the other side. Position the boards foil-side-down as shown in the Pictorial.

Due to the small area around some circuit board holes and the small areas between some foils, be careful you do not make solder bridges between adjacent foil areas. Use a minimum amount of solder and do not heat components excessively with the soldering iron. We recommend that you use a soldering iron of approximately 40 watts that has a 1/8" to 3/16" wide pyramid or chisel tip.

IMPORTANT NOTE: Except for a few components, your circuit board consists of two identical circuits, a right channel and a left channel. Each part called out in the left channel (R1201, C1209, D1201, etc.) will have a duplicate callout in the right channel. Therefore, in the Parts List the quantity of a component may be listed as "2," but will have a single callout (R1211 for instance).

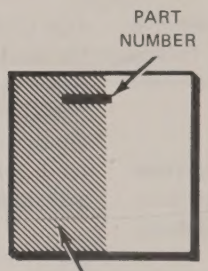
SAFETY WARNING – Avoid eye injury when you cut off excess lead lengths. Hold the leads so they cannot fly toward your eyes.

FOR GOOD SOLDER CONNECTIONS, YOU MUST **KEEP THE SOLDERING IRON TIP CLEAN.** WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.



STEP-BY-STEP ASSEMBLY

IDENTIFICATION DRAWING



The steps performed in this Pictorial are in this area of the circuit board.

START

Position the circuit board as shown in the identification drawing. Then proceed with the following steps.

( ) R1207: 100 Ω (brown-black-brown).

( ) R1201: 50 kΩ, precision.

( ) R1202: 15 kΩ, precision.

( ) R1212: 47 kΩ (yellow-violet-orange).

( ) R1211: 3300 (3.3K) Ω, precision.

( ) R1208: 100 kΩ (brown-black-yellow).

( ) R1213: 180 Ω (brown-gray-brown).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) R1214: 1500 Ω (brown-green-red).

( ) R1209: 120 Ω (brown-red-brown).

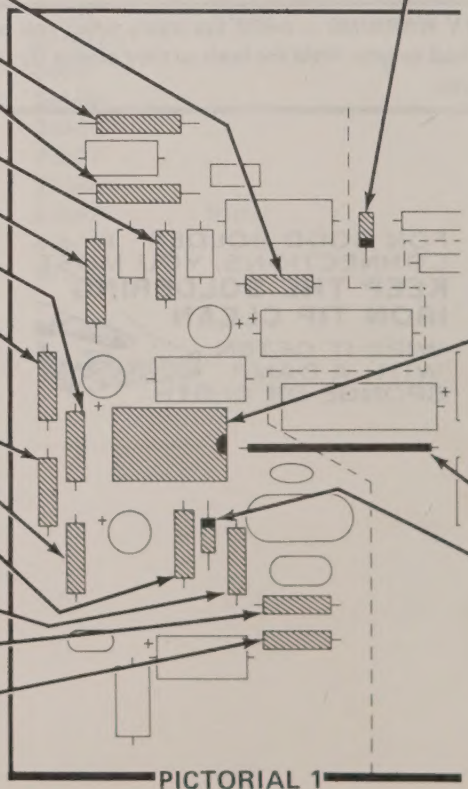
( ) R1206: 150 kΩ (brown-green-yellow).

( ) R1205: 270 kΩ (red-violet-yellow).

( ) R1204: 680 kΩ (blue-gray-yellow).

( ) R1215: 270 kΩ (red-violet-yellow).

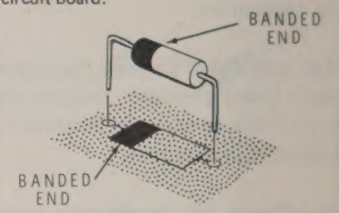
( ) Solder the leads to the foil and cut off the excess lead lengths.



PICTORIAL 1

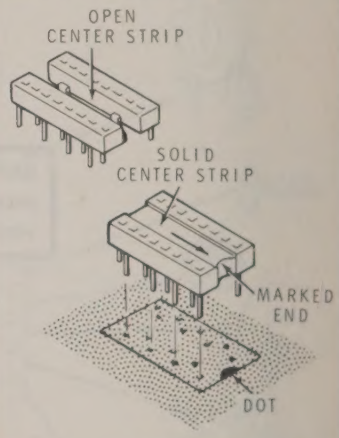
CONTINUE

NOTE: When you install a diode, as in the following step, be sure you position the banded end of each diode as shown on the circuit board.



( ) ZD1202: VRS-5A diode (#56-54).

NOTE: IC sockets have either an open or solid center strip. The socket with the open center strip may be installed either way. The socket with the solid center strip has an identification mark on one end (an arrow, a dot, or a notch). Always position this end of the socket toward the dot on the circuit board. Solder all the pins to the foils as you install the socket.



( ) IC socket at IC1201.

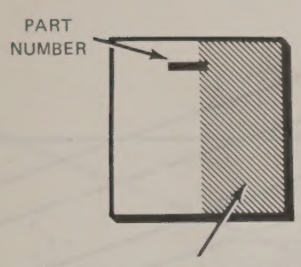
( ) Prepare a 2" length of blue wire: Cut the wire to the indicated length; then remove 1/4" of insulation from each wire end.

( ) 2" blue wire at "J."

( ) D1201: 1N191 diode (white-brown-white, #56-26). Be sure to position the banded end as shown.

( ) Solder the leads to the foil and cut off the excess lead lengths.

IDENTIFICATION DRAWING



The steps performed in this Pictorial are in this area of the circuit board.

START

( ) R1201: 50 kΩ, precision.

( ) R1202: 15 kΩ, precision.

( ) R1212: 47 kΩ (yellow-violet-orange).

( ) R1211: 3300 (3.3K) Ω, precision.

( ) R1216: 1000 Ω (brown-black-red).

( ) R1207: 100 Ω (brown-black-brown).

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) R1213: 180 Ω (brown-gray-brown).

( ) R1208: 100 kΩ (brown-black-yellow).

( ) R1214: 1500 Ω (brown-green-red).

( ) R1209: 120 Ω (brown-red-brown).

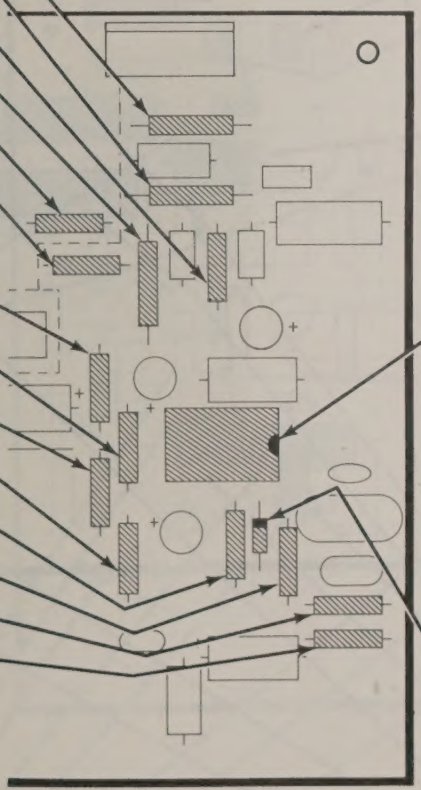
( ) R1206: 150 kΩ (brown-green-yellow).

( ) R1205: 270 kΩ (red-violet-yellow).

( ) R1204: 680 kΩ (blue-gray-yellow).

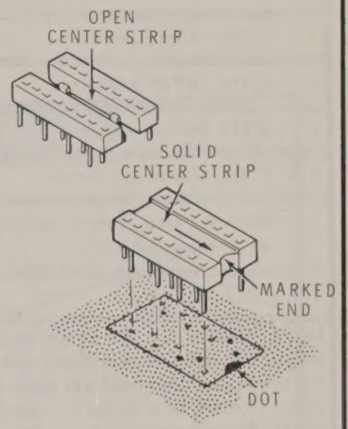
( ) R1215: 270 kΩ (red-violet-yellow).

( ) Solder the leads to the foil and cut off the excess lead lengths.



CONTINUE

NOTE: IC sockets have either an open or solid center strip. The socket with the open center strip may be installed either way. The socket with the solid center strip has an identification mark on one end (an arrow, a dot, or a notch). Always position this end of the socket toward the dot on the circuit board. Solder all the pins to the foil as you install the socket.

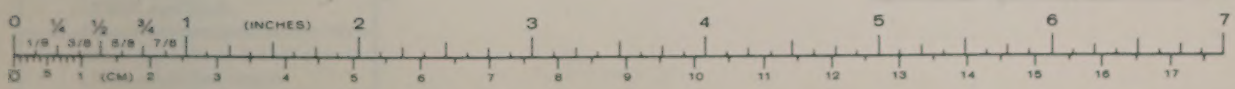


( ) IC socket at IC1201.

NOTE: When you install a diode, as in the following step, be sure you position the banded end of the diodes as shown on the circuit board.

( ) D1201: 1N191 diode (white-brown-white, #56-26). Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 2



START

NOTE: Disregard the colored end or band on the ends of polystyrene capacitors. These capacitors may be positioned in either direction.

( ) C1214: .027 μF polystyrene.

( ) C1201: 1500 pF polystyrene.

( ) C1211: 4700 pF polystyrene.

( ) C1213: 5600 pF polystyrene.

( ) C1201: 1500 pF polystyrene.

( ) C1214: .027 μF polystyrene.

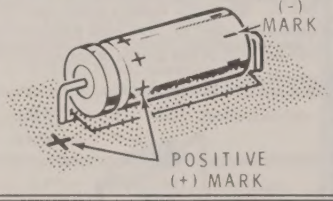
( ) C1213: 5600 pF polystyrene.

( ) C1211: 4700 pF polystyrene.

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) C1204: .47 μF Mylar.

NOTE: Before you install an electrolytic capacitor, look at it and identify the leads. One lead will have a plus (+) mark or a minus (−) mark near it. **Be sure** to install the positive lead in the positive-marked hole. Be careful; only the negative lead may be marked.



( ) C1208: 100 μF electrolytic.

( ) C1208: 100 μF electrolytic.

( ) C1216: 1500 pF polystyrene.

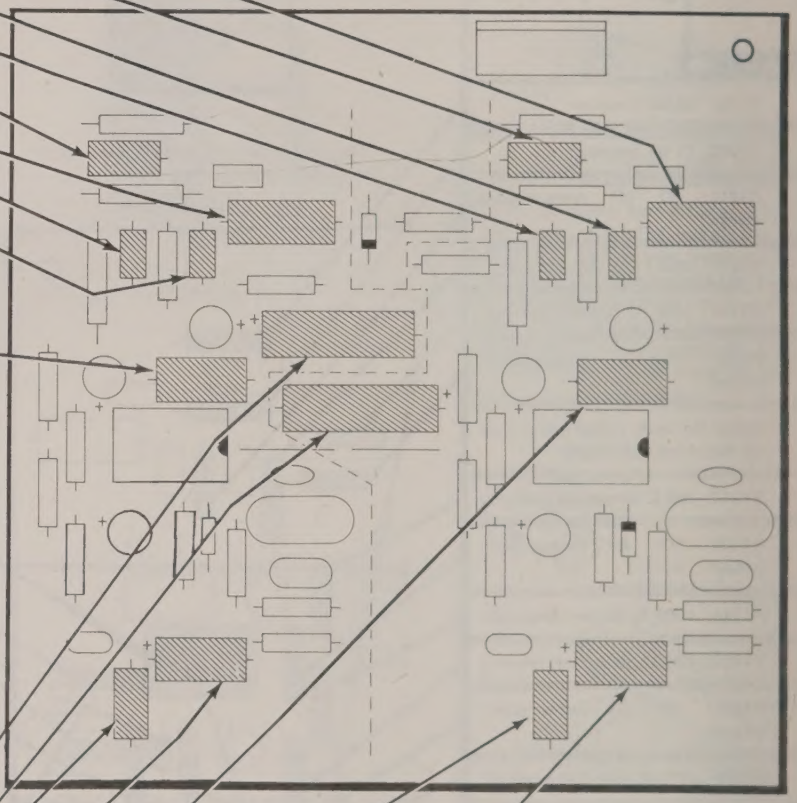
( ) C1215: 2 μF electrolytic. Position the positive (+) end as shown.

( ) C1204: .47 μF Mylar.

( ) C1216: 1500 pF polystyrene.

( ) C1215: 2 μF electrolytic. Position the positive (+) end as shown.

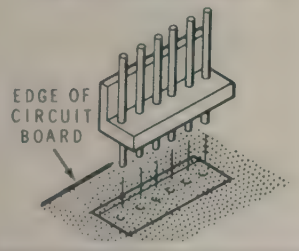
( ) Solder the leads to the foil and cut off the excess lead lengths.



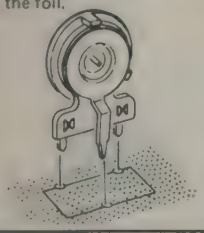
PICTORIAL 3

START

( ) P1201: Mount the 6-pin connector onto the circuit board. Position the flange as shown. Press the connector firmly onto the board; then solder the pins to the circuit board foil.



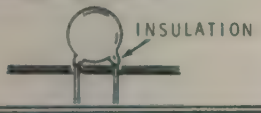
Mount controls in the next two steps as shown. As you mount each control, solder its leads to the foil.



( ) R1203: 10 kΩ control.

( ) R1203: 10 kΩ control.

NOTE: When you install disc capacitors, do not push the insulated portion of the leads into the circuit board holes. This could make it difficult to solder the leads to the foil. Also the leads of the Mylar capacitors may be coated with a clear film. If any soldering problem is encountered with these capacitors, apply more heat to the leads to melt this film.



( ) C1206: .05 μF disc.

( ) C1206: .05 μF disc.

( ) C1209: .047 μF Mylar.

( ) C1203: .33 μF Mylar.

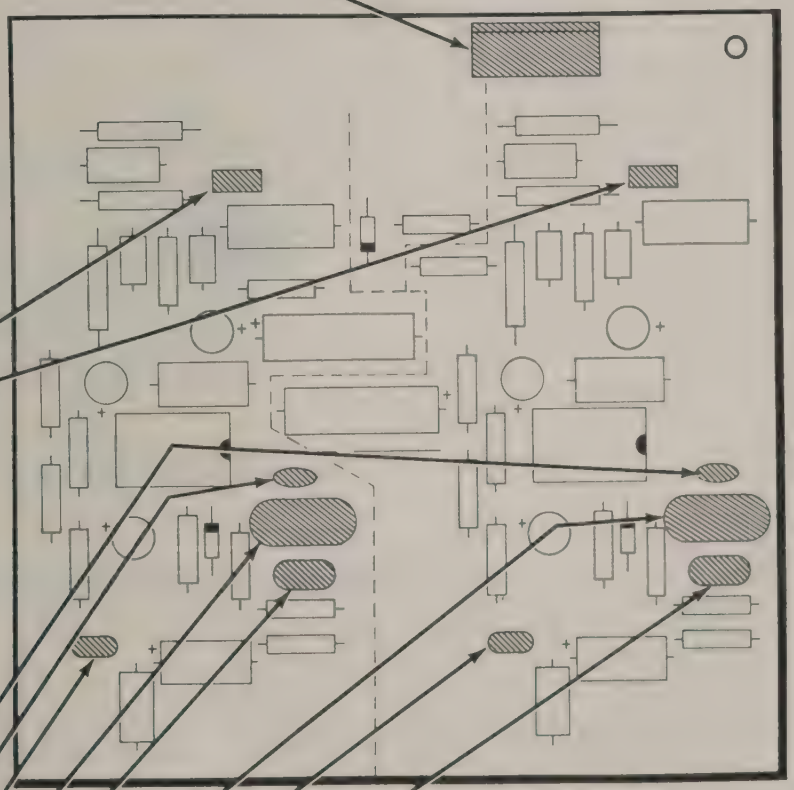
( ) C1202: .1 μF Mylar.

( ) C1203: .33 μF Mylar.

( ) C1209: .047 μF Mylar.

( ) C1202: .1 μF Mylar.

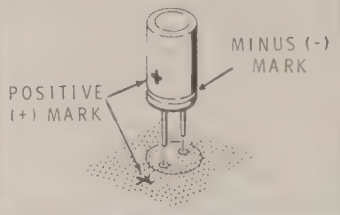
( ) Solder the leads to the foil and cut off the excess lead lengths.



PICTORIAL 4

START

NOTE: When you install vertical electrolytic capacitors, be sure you match the positive (+) lead of the capacitor near the positive (+) marking on the circuit board.



( ) C1212: 10 μF electrolytic.

( ) C1207: 10 μF electrolytic.

( ) C1212: 10 μF electrolytic.

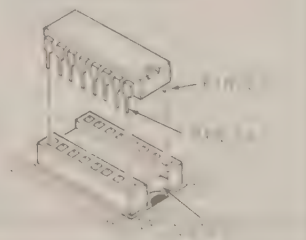
( ) C1207: 10 μF electrolytic.

( ) C1205: 10 μF electrolytic

( ) Solder the leads to the foil and cut off the excess lead lengths.

( ) Locate the two integrated circuits (#442-604). Then refer to Detail 5A and identify the pin 1 end of each IC.

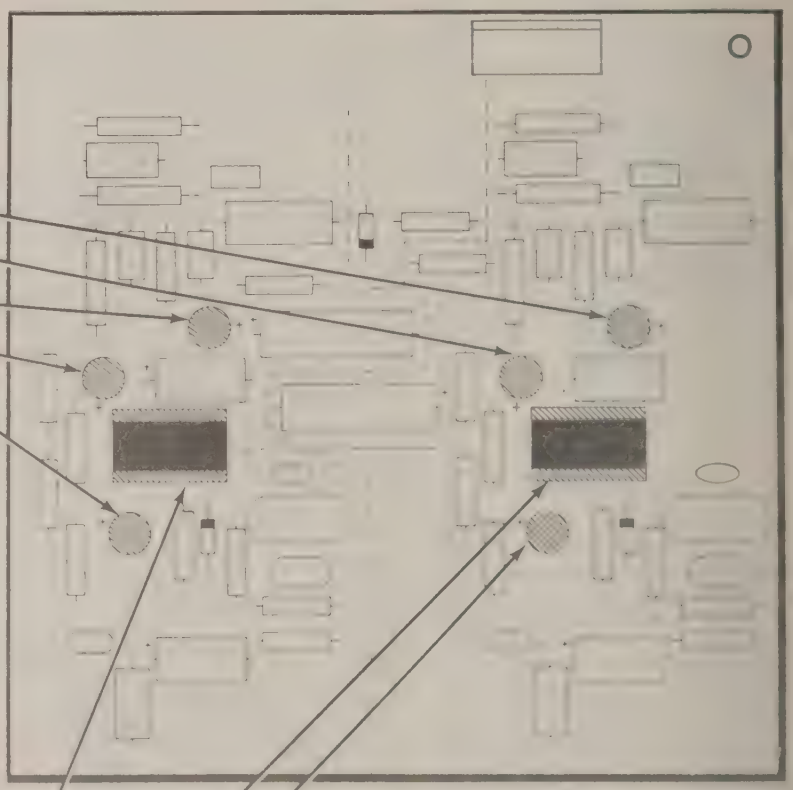
In the following steps, position the pin 1 end of each integrated circuit toward the identification mark on the end of the socket. Then carefully install the integrated circuit. Make sure all the pins are in their respective holes.

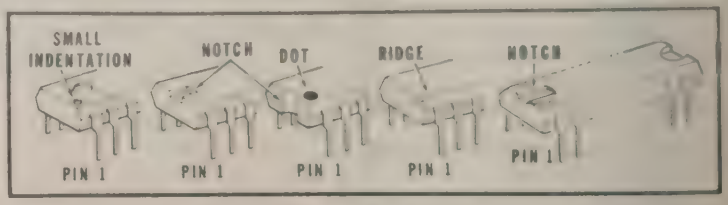


( ) IC1201: NE545B IC.

( ) IC1201: NE545B IC.

( ) C1205: 10 μF electrolytic. Match the positive (+) marking on the capacitor with the positive (+) marking on the circuit board. Solder the leads to the foil and cut off the excess lead lengths.





Detail 5A

PICTORIAL 5

CIRCUIT BOARD CHECKOUT

Carefully inspect the circuit board for the following conditions.

( ) Unsoldered connections.

( ) Poor solder connections.

( ) Solder bridges between foil patterns.

( ) Electrolytic capacitors for the correct position of the positive (+) end.

( ) IC's for proper installation.

( ) Diodes for the correct position of the banded end.

NOTE: Proceed to the "Dolby Module, Model AD-1504" section in the manual of the kit that you intend to install this circuit board in for instructions on how to test, install, and calibrate the Dolby Module.

OPERATION

The Dolby Module circuits are enabled at any time you depress the Dolby pushbutton on the receiver to the "in" position. To disable the Dolby circuit, depress the same pushbutton to release it to the "Off" position.

processed by the Dolby decoder network has not y encoded at the FM broadcast station, h frequency deterioriation will be noticed. For the Dolby decoding circuits should be enabled you know the program material has been ed at the transmitter. Special announcements tation, or special station listings in program will help determine the appropriate use of the Dolby module.

The Dolby FM Module was designed to reduce hiss in FM program material. This Dolby Type-B noise reduction system operates in the following manner: At the transmitter, low-level, high frequency program material is pre-emphasized before it is broadcast. This is the "encoding" process. These audio signals are received and detected at the receiver. At this time, the signals are routed through the Dolby-B network to be "decoded." Noise that accumulates after the signal is transmitted is attenuated during decoding. This provides noise-free material without significantly degrading the signal. The Dolby-B transmission normally improves the material reproduction of distant stations.

IN CASE OF DIFFICULTY

If your Dolby Module does not work correctly, the following information will help you locate the problem yourself. And if you find that you cannot locate the difficulty, the Customer Service organization at Heath Company is always ready to assist you. See the inside rear cover of the Manual for details on how to get this assistance.

If the difficulty in your Module is caused by a defective part, as indicated by the Heath warranty (located inside the front cover), there will be no charge to you for any replacements or service labor required. Whatever else may have caused the problem, we will repair this kit and place it in top operating condition for a small service fee plus parts.

This section of the Manual is divided into two parts. The first part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after your Dolby FM Module is assembled.

The second part, titled "Troubleshooting Chart," is provided to assist you in servicing the Module if the "General Troubleshooting Information" fails to clear up the problem, or if difficulties occur after you module has been in use for some time. The "Troubleshooting Chart" lists some possible difficulties that could arise along with possible solutions to those difficulties.

Try to analyze the symptoms of any problem you might have before starting any troubleshooting procedure. This can usually be accomplished by trying the various functions to determine abnormal operations.

NOTE: Refer to the "Circuit Board X-Ray and Voltage Chart" on Page 16 for the physical location and voltages of the various components.

GENERAL TROUBLESHOOTING INFORMATION

1. About 90% of the kits that are returned for repair do not function properly because of poor connections and soldering. Therefore, many troubles can be located by a careful inspection of connections to make sure they are soldered as described in the "Soldering" section of the "Kit Builders Guide." Reheat any doubtful connections.

2. Closely examine the circuit board foil in a good light to see that no solder bridges exist between adjacent connections. If available, a magnifying glass would be helpful for this purpose. Remove any solder bridges by holding the circuit board foil-side-down and placing a clean, hot soldering iron tip between the two points that are bridged until the excess solder flows down onto the tip. Compare your foil pattern against the "X-Ray View" on Page 16.

3. Be sure each integrated circuit is in its proper location (correct part number and/or type number). Be sure that each IC is correctly positioned in its IC socket.

4. Check each capacitor value. Be sure that a capacitor of correct value is installed at each capacitor location. Check each electrolytic capacitor to be sure the lead near the positive (+) marking is in the correct position.

5. Check each resistor value carefully. It would be easy, for example, to install a 100 Ω (brown-black-brown) resistor where a 1000 Ω (brown-black-red) resistor is called for. A resistor that is discolored, cracked, or shows any sign of bulging would indicate that it is damaged and should be replaced. Since damaged resistors are often the result of some other difficulty (such as faulty wiring), try to find out what caused the damage before you replace the resistor.

6. Be sure the correct diode is installed at each diode location, and that the banded end is positioned correctly.

7. Check all component leads connected to the circuit board. Make sure the leads do not extend through the circuit board and come in contact with other connections or parts.

If you still cannot locate and correct the trouble and if a voltmeter is available, check your Dolby FM Module voltages against those shown on the Schematic Diagram on Page 17, and in the "Circuit Board X-Ray and Voltage Chart" on Page 16.

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the rear cover of the Manual. Your Warranty is located inside the front cover.

Troubleshooting Chart

CONDITION	POSSIBLE CAUSE
No audio output from receiver; Dolby switch not depressed.	1. Dolby switch. 2. Wire harness or connector. 3. Solder bridge on Dolby module foil at or near 6-pin connector.
No noise reduction when Dolby switch is depressed.	1. Incorrect (uncoded) program material. 2. Incorrectly installed IC's or diodes. 3. Defective IC.

SPECIFICATIONS

Semiconductors

Integrated circuits	Two Dolby Laboratories' NE545B.
Diodes	Two 1N191. One VRS-5A zener.
Input-Output Ratio	1:1.
Noise Reduction (nominal)	
4000 Hz and higher	–10 dB.
2400 Hz	–9 dB.
1200 Hz	–6 dB.
600 Hz	–3 dB.
Power Requirements (from receiver)	15-volts DC, 50 mA.
Dimensions (approximate)	5-1/2" wide x 5-1/2" long x 1" high (14 cm x 14 cm x 2.5 cm.)
Net Weight	4-1/2 ounces (0.14 kg.)

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

CIRCUIT DESCRIPTION

Refer to the Block Diagram (on Page 15) and the Schematic Diagram (on Page 17) as you read the following "Circuit Description."

The input signal to the Dolby Module is taken from the FM stereo output on the multiplex circuit board. The signal has been de-emphasized by a 75 μsec time constant and filtered by the 19 kHz multiplex filter.

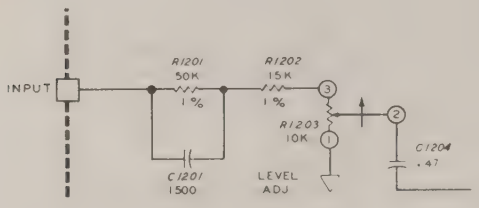


Figure 1

The R-C circuit shown in Figure 1 consists of resistors R1201, R1202, control R1203, and capacitor C1201. This circuit pre-emphasizes the input signal 50 μsec to a resultant 25 μsec de-emphasis time constant which is necessary to properly decode Dolby FM broadcasts. Resistor R1203 sets the signal gain through the Module at unity.

The signal is coupled through capacitor C1204 to the amplifier combination A and B. Amplifier B drives adder E. The output of E is split into two signal paths; the main path and a side-chain path. The signal to the side-chain path is coupled through resistor R1213 and capacitor C1213 to the band-pass filter and into amplifier C. The output of amplifier C is then fed back through two different paths. One signal continues through amplifier D and is rectified and integrated at block G. The other signal (a DC control signal) is routed back to vary resistance F. When this control voltage exceeds a threshold value, the resistance of F decreases and causes the turnover frequency of the variable bandwidth filter to increase. This attenuates the low and medium frequency signals. This signal, with a varying bandwidth, becomes the second signal at the output of amplifier C routed back through overshoot suppressor H. This suppressor operates under extreme transient conditions to clip the feedback signal or side-chain component and allows the direct-path signal to settle its steady-state operating point.

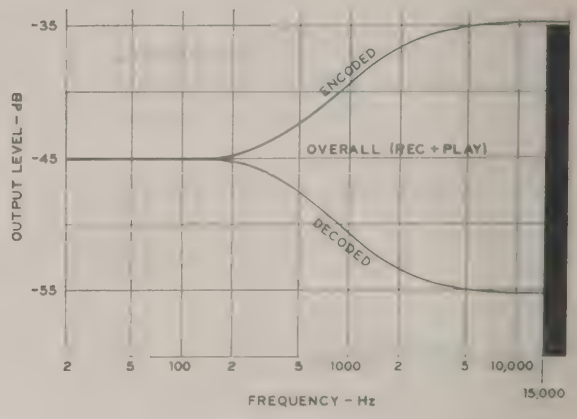
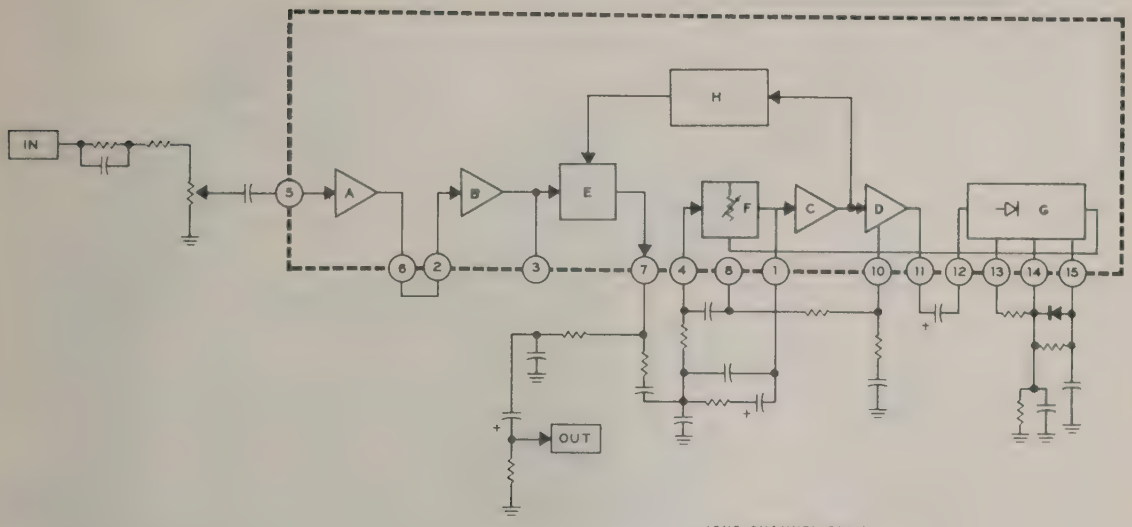


Figure 2

The signal from overshoot suppressor H is the side-chain path or noise reduction signal, which is algebraically added to the main signal in adder E. Thus, the output from adder E is a signal whose frequency response varies with the output level. Figure 2 illustrates the decoder response that is exactly complementary to the encoder response, the result of which is a flat characteristic.

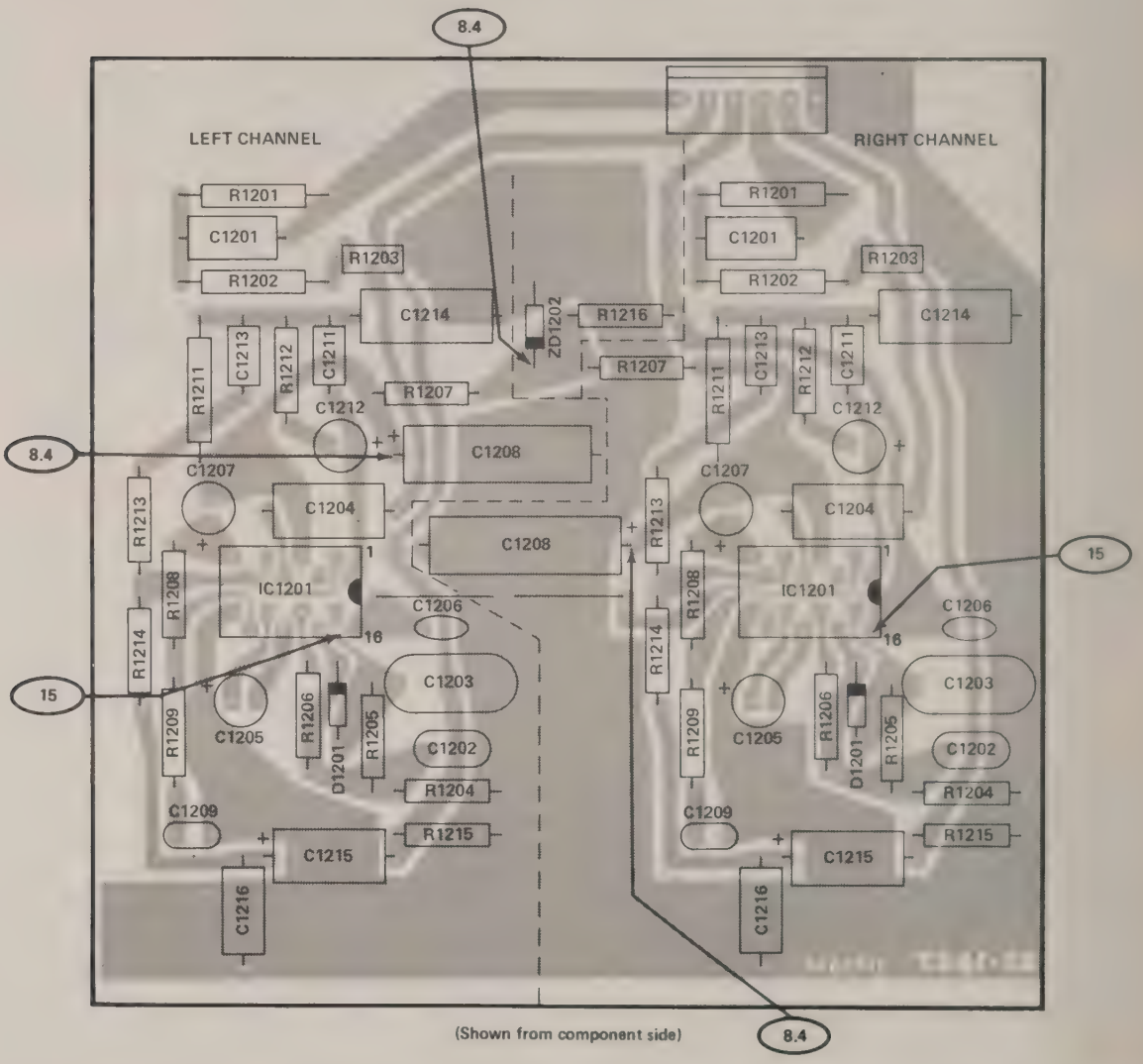
Additional reference material on Dolby circuits is available from your local electronic parts supplier.

BLOCK DIAGRAM



(ONE CHANNEL ONLY)

CIRCUIT BOARD X-RAY AND VOLTAGE CHART

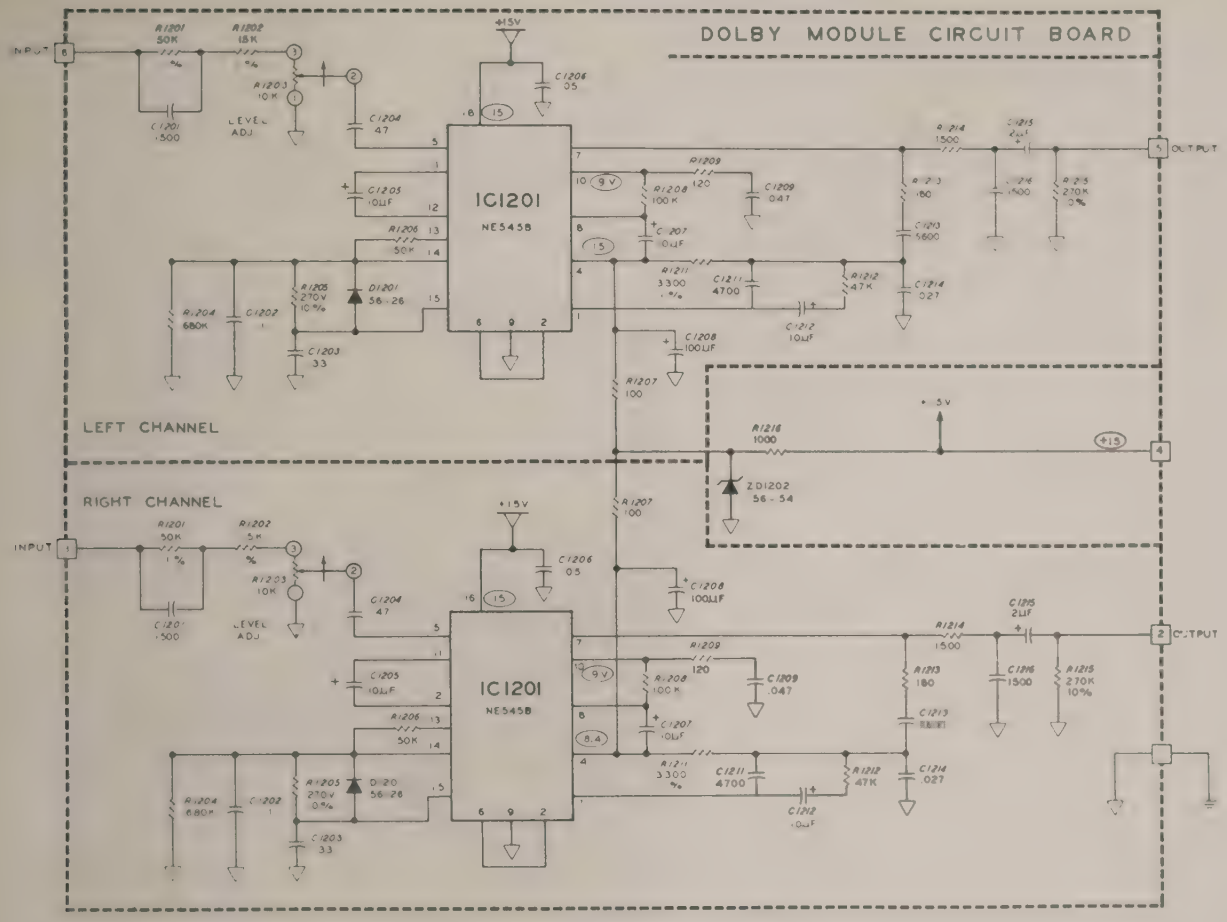


NOTE: To find the PART NUMBER of a component for the purpose of ordering a replacement part:

A. Find the circuit component number (R5, Q2, etc.) on the "X-Ray View and Voltage Chart."

B. Locate this same number in the "Circuit Component Number" column of the "Parts List."

C. Adjacent to the circuit component number, you will find the PART NUMBER and DESCRIPTION, which must be supplied when you order a replacement part.



SCHEMATIC OF THE
HEATHKIT®
DOLBY FM MODULE
MODEL AD-1504

NOTES:

1. Resistor values are given in ohms (k = 1000). Resistors are 1/2-watt, 5% tolerance unless marked otherwise.

2. All capacitor values of 1 and over are in pF (picofarads) unless marked otherwise. Capacitor values less than 1 are in μF (microfarads).

3. (9V) This symbol indicates a DC voltage measured from the point indicated to chassis ground.

4. ⏚ This symbol indicates chassis ground.

5. ▽ This symbol indicates circuit board ground.

6. □ This symbol indicates a circuit board pin connector.

7. This symbol indicates a clockwise rotation of a control.

8. The physical location of circuit board components is shown on the "Circuit Board X-Ray and Voltage Chart" on Page 16.

FOR PARTS REQUESTS ONLY

- Be sure to follow instructions carefully.
- Use a separate letter for all correspondence.
- Please allow 10 - 14 days for mail delivery time.

DO NOT WRITE IN THIS SPACE

INSTRUCTIONS

- Please print all information requested.
- Be sure you list the correct **HEATH** part number exactly as it appears in the parts list.
- If you wish to prepay your order, mail this card and your payment in an envelope. Be sure to include 10% (25¢ minimum, $3.50 maximum) for insurance, shipping and handling. Michigan residents add 4% tax.

  Total enclosed $_____
- If you prefer COD shipment, check the COD box and mail this card. COD ☐

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

The information requested in the next two lines is not required when purchasing nonwarranty replacement parts, but it can help us provide you with better products in the future.

Model # _____ Invoice # _____

Date Purchased _____ Location Purchased _____

LIST **HEATH** PART NUMBER	QTY.	PRICE EACH	TOTAL PRICE
TOTAL FOR PARTS			
HANDLING AND SHIPPING			
MICHIGAN RESIDENTS ADD 4% TAX			
TOTAL AMOUNT OF ORDER			

SEND TO: **HEATH COMPANY**
BENTON HARBOR
MICHIGAN 49022
ATTN: PARTS REPLACEMENT

Phone (Replacement parts only): 616 982-3571

THIS FORM IS FOR U.S. CUSTOMERS ONLY
OVERSEAS CUSTOMERS SEE YOUR DISTRIBUTOR

CUT ALONG DOTTED LINE

FOR PARTS REQUESTS ONLY

- Be sure to follow instructions carefully.
- Use a separate letter for all correspondence.
- Please allow 10 - 14 days for mail delivery time.

DO NOT WRITE IN THIS SPACE

INSTRUCTIONS

- Please print all information requested.
- Be sure you list the correct **HEATH** part number exactly as it appears in the parts list.
- If you wish to prepay your order, mail this card and your payment in an envelope. Be sure to include 10% (25¢ minimum, $3.50 maximum) for insurance, shipping and handling. Michigan residents add 4% tax.

  Total enclosed $_____
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NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

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LIST **HEATH** PART NUMBER	QTY.	PRICE EACH	TOTAL PRICE
TOTAL FOR PARTS			
HANDLING AND SHIPPING			
MICHIGAN RESIDENTS ADD 4% TAX			
TOTAL AMOUNT OF ORDER			

SEND TO: **HEATH COMPANY**
BENTON HARBOR
MICHIGAN 49022
ATTN: PARTS REPLACEMENT

Phone (Replacement parts only): 616 982-3571

THIS FORM IS FOR U.S. CUSTOMERS ONLY
OVERSEAS CUSTOMERS SEE YOUR DISTRIBUTOR

CUSTOMER SERVICE

REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company
Benton Harbor
MI 49022
Attn: Parts Replacement

Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.

OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. you'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

Please do not send parts for testing, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.

If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least THREE INCHES of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022

HEATH

Schlumberger

MP MASTER

MA22832

HEATH COMPANY • BENTON HARBOR, MICHIGAN

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